PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: WILLIAMS, et al.	Attorney Docket No. 9896.143.0
Application No.: 09/519,246	Examiner: Thomas C. Barrett
Filed: March 6, 2000	Group Art Unit: 3738

For: ENDOVASCULAR GRAFT COATINGS

AFFIDAVIT UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

State of Minnesota)
) S.S.
County of Hennepin)

Dr. Patrick E. Guire, being first duly sworn, deposes and says:

1. I am Dr. Patrick E. Guire. I received a B.S. degree in chemistry from the University of Arkansas, Fayettville in 1958 and a Ph.D. in biochemistry from the University of Illinois in 1963. I am currently a consultant for SurModics, Inc. (formerly B.S.I., Inc.), a company that I co-founded in 1979 and for which I worked as Senior Vice President of Research and Chief Scientific Officer and director from 1979 – 2004. At SurModics, Inc. I was, among other things, responsible for the research affairs of the company. During my tenure, I worked on the development, testing, and commercialization of coatings for vascular grafts including the coatings that can be used for vascular grafts that are disclosed in U.S. Pat. No. 4,979,959 (the "'959 patent" hereinafter).

2. This affidavit is being submitted to explain an aspect of the invention of U.S. Patent No. 4,979,959, of which I am the sole inventor.

3. A primary problem with synthetic vascular grafts has been failure resulting from thrombus formation. In fact, thrombogenicity has been considered one

of the primary impediments to acceptable patency rates. Thrombus formation may lead to occlusion of the conduit into which the graft is implanted. Therefore, it was counterintuitive to those of ordinary skill in the art to consider putting a hemostatic, (aka thrombogenic) coating on the surface of a graft. Such a coating would have been expected to only exacerbate the problems that result directly from thrombosis.

Historically, attempts to overcome thrombogenicity included implanting synthetic grafts made from materials that were considered to be inert. This approach typically did not produce acceptable results. More recently, the approach has been to modify the graft surface to increase its biocompatibility. For example, surfaces can be modified so that they promote tissue growth on and around the graft. If the tissue growth results in a tissue-covered graft surface but is not accompanied by thrombus formation, hyperplasia or inflammation, then the tissue coated graft surface would be tissue and blood compatible.

4. One of the research programs that I lead at SurModics, Inc. was aimed at developing an improved synthetic graft prosthesis that would exhibit improved long-term patency with decreased thrombogenicity. One of the approaches was to attach agents that encourage cell growth to the graft surface. The idea was that the cell growth agents would encourage endothelialization of the graft thereby preventing thrombus formation and/or other inflammatory responses by shielding the graft surface. Because of the concerns of thrombosis, cell growth agents were carefully chosen so that they did not have thrombogenic properties. For example, fibronectin and type IV collagen were selected. It was my understanding, based on the scientific literature, that both of these agents were non-thrombogenic. These cell growth factors were successfully attached to graft and other surfaces utilizing propriety SurModics, Inc. photoimmobilization technology.

5. The research program described in 4. above, is one aspect of an invention that is included in the description of the '959 patent. Although the surface modification technology described in the '959 patent can be used in conjunction with any number of biocompatible agents and/or devices or surfaces, vascular grafts were exemplified to explain and describe the invention. For example, the vascular grafts described in Example 1 of the '959 patent were coated with the non-thrombogenic agent fibronectin and implanted into dogs. Other non-thrombogenic endothelial cell attachment/growth factors, such as type IV collagen and laminin are also described in Example 1 and can be attached to graft surfaces, as well as other surfaces where cell growth is to be encouraged. Thus, non-thrombogenic agents can be attached to vascular grafts as well as other devices. Likewise, the invention of the '959 patent can be used to attach thrombogenic agents to surfaces where it is desired to encourage thrombus formation. Such surfaces may include those of sutures or soft or hard tissue prosthesis. The invention

of the '959 patent is broad and is not limited to any specific combination of device and agent. Rather, the invention can be used to modify the surface of any device in any way that is desired. However, because of the concerns posed by thrombogenicity outlined in 3. above, thrombogenic coatings for vascular grafts are not disclosed by the '959 patent. At column 4, lines 12-19 and lines 28-42, respectively, non-limiting examples of devices and biocompatible agents to which the invention of the '959 patent can be applied are provided. Although the lists include vascular grafts and thrombogenic agents, the combination of the two for use together is not and was not intended to be suggested since, as is described in the '959 patent, thrombosis, with respect to vascular grafts, was considered undesirable. Instead, as described in the '959 patent (column 3, lines 25-26), biocompatible agents are to be combined with specific devices based on the agent's ability to enhance the function of a particular device. Therefore, since thrombosis was known to cause graft failure, the combination of a thrombogenic agent and a vascular graft is not and was not intended to be suggested since a thrombogenic agent would not enhance the function of the graft.

6. In conclusion, my invention as described in the '959 patent not only does not suggest thrombogenic coatings for vascular grafts, but also warns against such a combination. It was counterintuitive at the time of my invention, as well as at the time of the Williams and Clapper invention of the 09/519,246 application to provide thrombogenic coatings on vascular grafts because of the problems associated with thrombogenicity.

Patrick E. Guire

Patrick E. Guire

Subscribed and sworn before me
this 1st day of November, 2006.

Shannon K. Blum

SHANNON KELLY BLUM
Notary Public-State of Minnesota
My Commission Expires
January 31, 2011